REMARKS

Claims 9 and 10 are pending in the present application and claims 1 and 3 have been cancelled. Applicants expressly reserve their right to pursue the subject matter of claims 1 and 3 in this or a subsequent application. No new matter has been introduced by the amendments to the claims.

The Examiner has asserted, in the response to arguments section of the January 3, 2002 Office Action, that the significance of the constants in the equations $y \leq x^{-0.62}$ and $y \leq x^{-0.62}$ is unclear because the scatter in experimental data for Experiments 1-9 of the specification and data for Lonza KS graphites presented in Dr. Sato's declaration of January 4, 2001 is greater than the differences between the equations $y \leq x^{-0.62}$ and $y \leq x^{-0.62}$.

Applicants respectfully disagree.

The present invention provides lithium ion secondary batteries having superior undoping capacity (mAh/g), capacity at 2.8 mA/cm^2 (mAh/g), and capacity at 5.6 mA/cm^2 (mAh/g), where the negative electrode is composed of a graphite material having a surface area (y) and a particle size (x) which satisfy the relationship $y \leq x^{-0.62}$.

Applicants note that, in accordance with the plot attached to the January 3, 2002 office action, Examples 1-5 and 9 of the specification satisfy the surface area to particle size relationship of the invention and Examples 6-8 of the specification do not satisfy the surface area to particle size relationship of the invention. The following Table 1 reproduces selected charging capacity data for Examples 1-9 from Tables 1 and 2 of the specification.

Table 1

Examples satisfying $y \leq 42x^{-0.62}$	Undoping Capacity (mAh/g)	Capacity at 2.8 mA/cm^2 (mAh/g)	capacity at 5.6 mA/cm^2 (mAh/g)
1	363	362	334
2	356	350	313
3	360	356	347
4	348	341	285
5	365	368	364
9	345	342	335
Average of Ex. 1-5,9	***356***	***353***	***330***
Examples not satisfying $y \leq 42x^{-0.62}$			
6	349	327	256
7	338	321	206
8	343	330	269
Average of Ex. 6-8	***343***	***326***	***244***

Kindly note that lithium ion secondary batteries comprising a negative electrode made of a carbon material according to one of Examples 1-5 or 9 satisfy the surface area to particle size relationship set forth in claims 1 and 9, e.g., $y \leq 42x^{-0.62}$, and possess superior undoping capacity (mAh/g), capacity at 2.8 mA/cm^2 (mAh/g), and capacity at 5.6 mA/cm^2 (mAh/g) properties to those batteries comprising graphite negative electrodes which do not satisfy the surface area to particle size relationship set forth in claims 1 and 9, i.e., carbon material in which $y > 42x^{-0.62}$.

None of the Lonza KS graphites satisfy the surface area to particle size relationship set forth in the claims, i.e., none of the Lonza KS graphites are below the $y \leq 42x^{-0.62}$ curve provided by claims 1 and 9, such that batteries having graphite negative electrodes composed of Lonza graphites, like batteries made with graphites of Examples 6-8, possess inferior undoping capacity

(mAh/g), capacity at 2.8 mA/cm^2 (mAh/g), and capacity at 5.6 mA/cm^2 (mAh/g) properties compared to batteries of the present invention.

Claims 1, 3, 9 and 10 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Omaru et al. (U.S. Patent 5,561, 005) with evidence shown by Omaru et al. (U.S. Patent 5,639, 575) and Fauteux (U.S. Patent 5,512,392). The rejection is respectfully traversed.

A brief discussion of the present invention as provided by claims 9 and 10 may be of assistance in explaining the differences between the present invention and the disclosure of the cited prior art.

The present invention provides lithium ion secondary batteries having high capacity, rapid charge and discharge characteristics, a substantially constant charge and discharge potential, and an excellent cycle performance.

A lithium ion secondary battery provided by claim 9 comprises a positive electrode, a non-aqueous electrolyte, a separator and a negative electrode comprising a carbon material capable of charging and discharging lithium ions.

Carbon materials suitable for use in negative electrodes comprise an amorphous carbon-coated graphitic carbonaceous material prepared by coating the particle surfaces of a graphite material with a carbonizable organic material, calcining and pulverizing the coated graphite material. More particularly, suitable carbon materials comprise a particulate graphite material coated with an amorphous carbon layer as depicted schematically in Figure A below.

Graphitic carbon particles coated with an amorphous carbon layer uitalbe for use in batteries fo the invention satisfy both conditions (a) and (b), as follows:

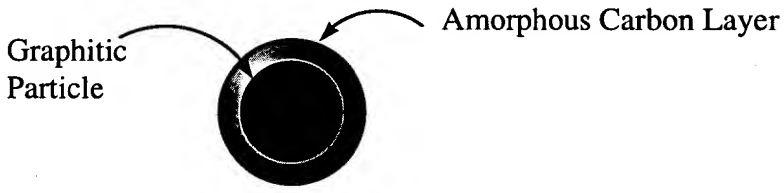
(a) when the BET specific surface area of the graphite material is represented by y (m^2/g) and the particle size by x (μm), the graphite material satisfies the following formula (I):

$$y \leq 42x^{-0.6} \ (4 \leq x \leq 40, \ 0.1 \leq y \leq 25) \quad \text{(I)}$$

(b) in Raman spectroscopic analysis using argon ion laser light with a wavelength of 5,145 Å, the ratio of the strength of the peak existing in the region of 1,350-1,370 cm^{-1} (IB) to the strength of the peak existing in the region of 1,570-1,620 cm^{-1}, which is represented by an R value (IB/IA), is 0.001 to 0.2.

Graphitic carbon particles coated with an amorphous carbon layer which are suitable for use in batteries according to claim 9 may be represented by a particle having a cross-section of Figure A.

Figure A



By using an amorphous carbon-coated graphitic carbonaceous material as the negative electrode, the lithium ion secondary battery of the present invention has a higher capacity and also superior rate and cycle characteristics than batteries having negative electrodes composed of a non-coated graphite material (see page 15, first paragraph).

In contrast to batteries of the present invention, Omaru et al (USP 5,561,005) teaches a secondary battery having a non-aqueous electrolyte comprising:

a negative electrode consisting essentially of a resin binder and either a non-graphitic carbonaceous material or a graphitic material,

a positive electrode including a composite oxide of lithium and a transition metal, and

a non-aqueous electrolyte including a dissolved electrolyte in a non-aqueous solvent.

Moreover, Omaru '005 teaches secondary batteries having a negative electrode consisting of a resin binder and either (1) a non-graphitizable carbonaceous material (see, for example, column 5, lines 43-45 and claim 1) or (2) a graphite-based carbonaceous material (see, for example, column 7, lines 31-36, and claim 5). Omaru '005 does not teach negative electrodes composed of a carbon particles which consist of a graphitic substrate having an amorphous carbon layer coating the graphitic particle.

As the references are understood, Omaru '575 and Fauteux merely teach particular physical measurements for Lonza KS 75 graphites such as particle size and surface area. Neither Omaru '575 or Fauteux overcome the limitations of Omaru '005.

Claim 9 is patentable over Omaru '005 with evidence shown by Omaru '575 and Fauteux. Claim 10 depends from claim 9 and is therefore also patentable over Omaru '005 with evidence shown by Omaru '575 and Fauteux.

It is respectfully submitted that the subject application is in condition for allowance. Early and favorable action is requested.

Applicants believe that additional fees are not required for consideration of the within Response. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized and requested to charge Deposit Account No. **04-1105**.

Respectfully submitted,

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By: _____

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